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## Virtual Business Support Infrastructure for Entrepreneurs

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### Abstract

In the knowledge economy nowadays, a physical working space is less valuable than virtual networks and business clusters. Science technology parks and innovation centers, virtual incubators and business information centers could be a far more convenient way to support start-ups in the process of transferring business ideas, challenges and innovative technologies into competitive profitable businesses that create wealth. Presence and cognition technologies play an important role in the knowledge management process, helping entrepreneurs learn and solve lots of different problems more effectively. In this regard, it is very important to figure out the most effective technological solutions and principal directions for implementing work-based learning strategies in the learning process. The work with knowledge implies creation of content: generation of a new knowledge in order to stimulate the development of innovative processes. The goal of the paper is to get a new perspective view and understanding of the development of virtual business support infrastructure is facilitated in order to develop a network of innovative SMEs, foster communication, collaboration, individual's motivation and exchange of experiences of SMEs. This paper describes the theoretical principles of information flow modelling in network of collaborative and innovative SMEs with a practical example of a virtual business support infrastructure. The research idea is to describe the principles of virtual support system for entrepreneurs, cognition technologies that influence development in each individual to ensure sustainable entrepreneurship. WBL is used as a tool to achieve the goal of internalizing knowledge by experience in the workplace. For an employee, it is an opportunity to learn and possibly obtain a higher degree and collaboration with colleagues, while for an employer a way to increase the power of the company thanks to better-qualified staff and business partners. The result of the research is the analysis of the virtual business support infrastructure, improved quality of knowledge flow, and recommendations for developing work-based learning with regard to the encouragement of efficient knowledge management in entrepreneurship for common aims.

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## 1. Introduction

Today's technology is changing the way we learn and work. The new technologies may be self-accelerating, but they are not self-determining. Authors must try even harder to link different theoretical and practical methods using the opportunities of presence and cognition technologies, which increase the quality of personal development and improve entrepreneurship. The problem is the inefficient or incomplete utilization of presence and cognition technologies and the non-usage of knowledge management technologies and work-based learning potential for the useful development of virtual business support infrastructure. In this regard, it is very important to figure out the most effective technological solutions to design a software controller that would be universal for more learning subjects and suitable for more companies. The object of study is development of virtual business support infrastructure and correlation between innovative SMEs development to ensure sustainable entrepreneurship through an improvement of knowledge flow quality and work-based learning. The main study question is how models of information flow and work-based learning could improve the efficiency and quality of further knowledge management to ensure sustainable entrepreneurship using a virtual business support infrastructure. The target audience for the project is representatives of enterprises. There is a wide range of possibilities – the use of multimedia and online teaching courses for setting up business, tutorial for using computer engineering and problem solving, office document and file keeping systems, remote access to various computer programs, participation in video conferences and putting one's products on auctions etc. The authors of this paper have provided an analysis of the virtual business support infrastructure; describing custom based learning resources and improved quality of knowledge flow, general based software program and recommendations for developing work-based learning with regard to the encouragement of efficient knowledge management in entrepreneurship for common aims. Practical example, describing educational program with planned learning. A lot of businesses depend on information and communication technology. The use of modern technology in business and staff training and professional development merely has to be a tool for improving the actual service.

## 2. Terms and definitions

Authors of this paper are using some specific terms. It is therefore necessary to explain terms and abbreviations used in this paper.

Definition 1 Presence technology is a type of application that makes it possible to locate and identify a computing device wherever it might be, as soon as the user connects to the network. [1]

Definition 2 Cognitive Technology's mission is to provide a forum for scientific analysis of new developments that can assist or augment cognitive functioning—areas of research and development that range from perception, memory, comprehension, decision making, problem solving, and reasoning, and functioning that may occur at the individual or the group level. [2]

Definition 3 Knowledge Management (KM) comprises a range of strategies and practices used in an organization to identify, create, represent, distribute, and enable adoption of insights and experience. [3]

Definition 4 Work-based learning (WBL) - Work Based learning generally describes learning while a person is employed. The learning is usually based on the needs of the individual's career and employer, and can lead to nationally recognized qualifications. [4].

## 3. Presence and cognition technologies

Constant technological revolution somehow makes knowledge management and entrepreneurship difficult but technology is a tool, body of equipment and processes, action and material, knowledge and skills which are necessary in order to achieve goals by using current resources [5].

Presence technology is an integral part of third generation (3G) wireless networks, and is being employed across a wide variety of communication devices, including cellphones, laptop computers, PDAs, television sets, and pagers. Privacy issues are typically addressed by allowing a high degree of user-defined control, allowing people to select conditions in which they are detectable, for example. [1] It's been said that unified communications is the next big thing in networking, but presence may be the next big thing in unified communications. In case you're not familiar with it, presence, put simply, is real-time information about a person's availability. The reason that presence is such a powerful tool is that people no longer use a single communications mechanism. Today, nobody just uses the phone or email. Instead, people often use office phones, cell phones, email, instant messaging and videoconferencing, to name just a few types of communications. Unified messaging brings all of these forms of communication together, but the problem has always been in knowing which communications mechanism is best suited to a specific instance. For example, suppose that you need to get in touch with one of your co-workers. [6]

Cognitive technology refers to technologies that carry out cognitive operations. Thus, rather than augmenting human physical capacity, these technologies augment mental capacities. Technology is widely used to augment human capabilities. Cognitive technology can increase human mental capacity by enabling to “offload” cognitive operations onto technology. When cognitive technology is used to help humans by enabling to offload cognitive operations, the technology is working in the background. To save time and cognitive resources, humans devolve and delegate cognitive operations that they could do themselves. [7]

With technologies constantly evolving, authors are debating another relationship, and that is between education and technology, as learners are getting used to new technologies and expecting more flexible learning schemes. Optimal results cannot be reached by quantitative actions alone as long as the current processes and procedures of informatization are shape-shifting while sticking to the same old contents.

#### **4. Knowledge management**

The work with knowledge implies creation of content: generation of a new knowledge in order to stimulate the development of innovative processes. There are a number of different factors interfering with the successful knowledge formation process.

In order to manage knowledge, it first needs to be created (e.g. by learning), gathered (from conversations with other people, written sources, etc.), synthesized and combined together. New technologies, which act as intelligent agents and assistants to search, summarize, conceptualize and recognize patterns of information and knowledge are rapidly emerging.

Knowledge management requires technologies to support the new strategies, processes, methods and techniques to better create, disseminate, share and apply best knowledge, any time and any place. It is a systematic process that focuses on the acquisition, transfer and use of effective, topical knowledge and best practice, thus promoting sustainable operation of an organization.

Different environments can have different influences on learning. In order to better organize structurization of information and ensure a successful flow of knowledge for entrepreneur. Knowledge sharing through participation and social interaction is an important facilitator of knowledge acquisition, and hence of learning. [8] To enable successful knowledge flow, a virtual system must ensure services allowing entrepreneurs to learn everything they need at any given moment and share their experience in the most effective way if they are willing to do so. Knowledge management is obviously powerful, for an effective KM initiative across the organization, there should be knowledge sharing through social interaction, participation, and engagement in various forms.

## 5. Work-based learning

In these dynamic times, when everything changes fast, being unprepared is not an excuse. Work-based learning as a new concept and understanding of learning at workplace and knowledge management conceptualized as a spiral of knowledge creation by enabling the dynamic knowledge conversion process between the individual and the organization, and between the tacit and explicit knowledge deliver the grounds for organizational learning. [9] WBL is used as a tool to achieve the goal of converting tacit knowledge into explicit by maximizing learning opportunities and internalizing knowledge by experience in the workplace.

According to Wagner [10], WBL has a long history of experimentation and the educational concepts and practices described as workplace learning and WBL has a rich epistemological tradition in debates about:

- The relation between education and the economy;
- The relation between theory and practice in education processes;
- The dualism of education and training and associated social and institutional divisions.

Described WBL uses general designed software controller and custom designed learning resources, together creating a virtual information system for WBL. In order to achieve effective development, authors propose to design a software controller that would be universal for several learning subjects and suitable for several companies. Learning resources on the other hand would be custom designed specifically for the company, although sharing learning resources between companies is also possible.

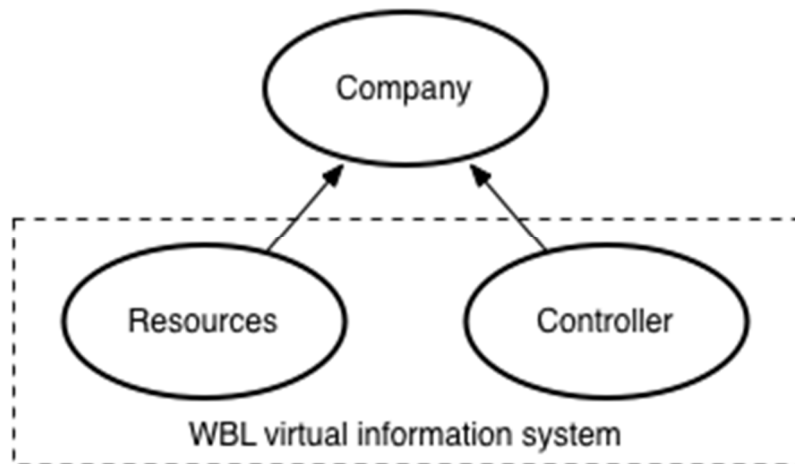


Fig. 1. Components of WBL virtual system for company

In the schema above the supplier is providing software and designing learning resources and providing it to the company creating a virtual system for WBL.

To achieve maximum universality the resources contain not only static data (knowledge base), but also a procedural routine that defines not only what is displayed, but also how it is displayed. Along with how the input from user should be realized and what he actually can input. And finally how the response should look like and what information is contained in a response.

Such a system is depicted on picture 3 with two separate entities called controller and learning resource.

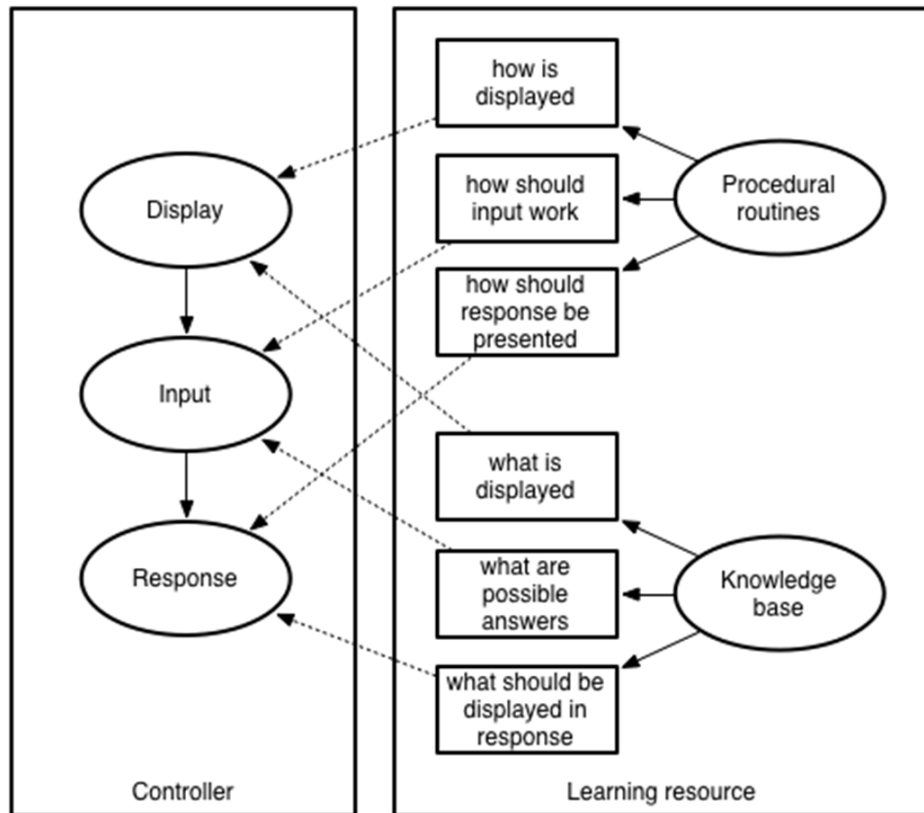


Fig. 2. Work-based virtual learning system internal structure

## 6. General based software controller

Controller is a software tool that manages and presents learning resources. Its purpose is at least to display the information appropriately, grab users input and then show a response in a defined form. To ensure quality of virtual learning system it is appropriate to provide a feedback loop back to the experts who are providing learning resources.

In figure 3 you can see the function of controller with a feedback loop put in perspective with a user and an expert. Solid lines are representing information flows and a dashed line represents function of the controller.

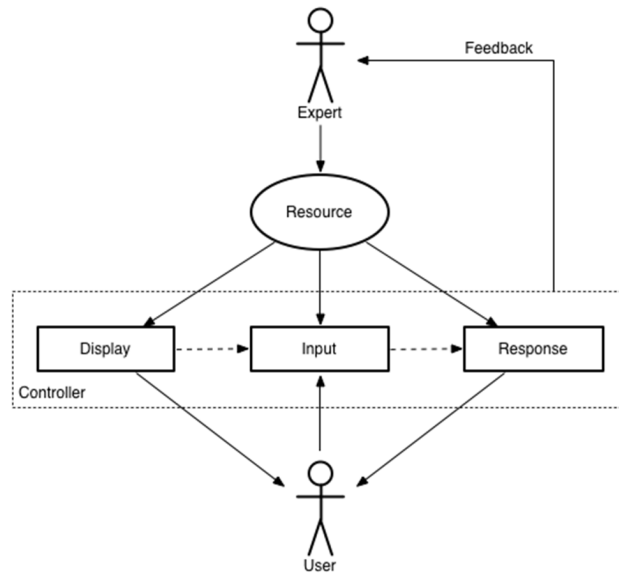


Fig. 3. Purpose of the controller in the virtual WBL system

## 7. Custom based learning resources

In order to achieve maximum effectiveness, learning resource design is based on company environment, analysis of staff's needs and current level of knowledge and on goals of WBL implementation in the company.

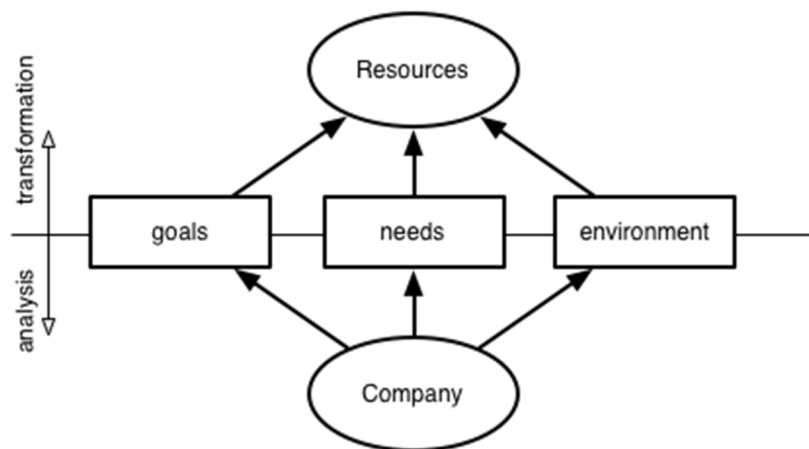


Fig. 4. Didactical analysis (decomposition) and transformation

Analysis is the first part of creating successful learning resource. In the process of analysis it is important to identify goals, needs and environmental points. Didactical transformation of gained information is a subsequent step and resulting learning resource can be used in company along with the controller. This process is depicted in figure 4.

## 8. Educational program with planned learning

Educational program Memostation is an example of this approach. Memostation is a computer educational software using principle of spaced repetition. Its algorithm is based on Hermann Ebbinghaus forgetting curve, which predicts a forgetting rate of piece of information. [12]

Knowledge base and procedural routines are stored and categorized within the program in form of databases called learning resources. Learning resources contain items which are minimalistic pieces of information prepared by didactical analysis and transformation.

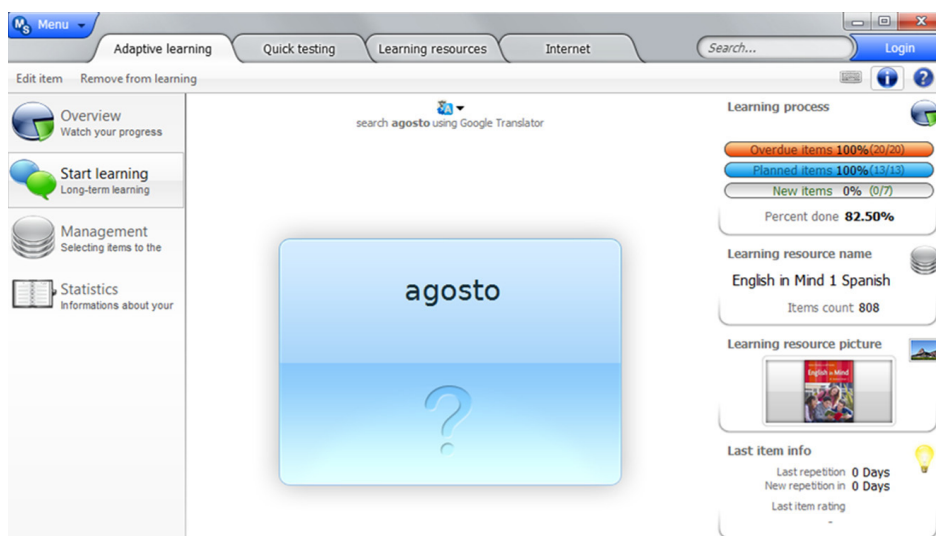


Fig. 5. Computer educational software Memostation

If the program is used in a way proposed in this article, it plays an important role in a virtual system for WBL.

## 9. Conclusions

Technology advances, we can expect to see more activities taken over by technology. The work with knowledge implies creation of content: generation of a new knowledge in order to stimulate the development of innovative processes. Authors believe that the best way to prevent the knowledge from becoming obsolete is to study methods and create models of virtual systems that can also be adjusted for the knowledge flow processes in virtual system used for WBL.

The goal of the paper is to get a new perspective and understanding of the development of virtual business support infrastructure is facilitated in order to develop a network of innovative SMEs, foster communication, collaboration, individual's motivation and exchange of experiences of SMEs.

This study provides theoretical principles of the virtual support system for entrepreneurs, cognition technologies that influence development in each individual to ensure sustainable entrepreneurship. WBL is used as a tool to achieve the goal of internalizing knowledge by experience in the workplace.

The result of the research is the analysis of the virtual business support infrastructure, improved quality of knowledge flow, recommendations for developing work-based learning, and educational program Memorandum is an example of this approach with regard to the encouragement of efficient knowledge management in entrepreneurship for common aims.

A combination of an absolutely innovative approach, increasing use of the knowledge potential, alteration of traditional procedures in every industry and activity using the opportunities provided by virtual support system resulted in a new way of thinking and action. The fruition is quality change – more success stories of employing and developing innovative ideas, increased efficiency of production and service delivery.

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